

Claims:

1. A method of vaccinating a mammal against a disease state, comprising administering to said mammal, within an appropriate vector, a nucleotide sequence encoding an antigenic peptide associated with the disease state;

additionally administering to said mammal a compound which enhances both humoral and cellular immune responses initiated by the antigenic peptide, the compound being selected from:

- 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;
5-(2-formyl-3-hydroxyphenoxy)pentanamide;
N,N-diethyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
N-isopropyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
ethyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;
5-(2-formyl-3-hydroxyphenoxy)pentanonitrile;
(±)-5-(2-formyl-3-hydroxyphenoxy)-2-methylpentanoic acid;
5-(2-formyl-3-hydroxyphenoxy)-2,2-dimethylpentanoic acid;
methyl 3-(2-formyl-3-hydroxyphenoxy)methylbenzoate;
3-(2-formyl-3-hydroxyphenoxy)methylbenzoic acid;
benzyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;
5-[4-(2-formyl-3-hydroxyphenoxy)-N-butyl]tetrazole;
7-(2-formyl-3-hydroxyphenoxy)heptanoic acid;
5-(2-formyl-3-hydroxy-4-n-propoxyphenoxy)pentanoic acid;
5-(4,6-dichloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
5-(2-formyl-3-hydroxyphenoxy)-N-methylsulphonylpentanamide;
ethyl 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoate;
5-(4-chloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
5-(3-acetylamino-2-formylphenoxy)pentanoic acid;
Aminoguanidine;
4-(2-formyl-3-hydroxyphenoxy)butanoic acid;
6-(2-formyl-3-hydroxyphenoxy)hexanoic acid;
ethyl 4-(3-acetylamino-2-formylphenoxy)methyl)benzoate;
4-(3-acetylamino-2-formylphenoxy)methyl)benzoic acid;
2-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;

5- [4-(2-formyl-3-hydroxyphenoxy)methyl]phenyl]tetrazole;
5-(2-formyl-3-hydroxy-4-methoxyphenoxy)pentanoic acid;
3-(2-formyl-3-hydroxyphenoxy)propionitrile;
4-Hydroxyphenylacetaldehyde;
5 Phenylacetaldehyde;
4-Methoxyphenylacetaldehyde;
1-hydroxy-2-phenylpropane;
3-Phenylpropionaldehyde;
4-Nitrobenzaldehyde;
Methyl 4-formylbenzoate;
4-Chlorobenzaldehyde;
4-Methoxybenzaldehyde;
4-Methylbenzaldehyde;
8,10-Dioxoundecanoic acid;
15 4,6-Dioxoheptanoic acid;
Pentanedione;
5-methoxy-1-tetralone;
6-methoxy-1-tetralone;
7-methoxy-1-tetralone;
20 2-tetralone;
3-hydroxy-1-(4-methoxyphenyl)-3-methyl-2-butanone;
2',4'-dihydroxy-2-(4-methoxyphenyl)acetophenone;
2-hydroxy-1-(4-methoxyphenyl)-pent-2-ene-4-one;
Naringenin 4',5,6-trihydroxyflavonone;
25 4'-methoxy-2-(4-methoxyphenyl)acetophenone;
6,7-dihydroxycoumarin;
7-methoxy-2-tetralone;
6,7-dimethoxy-2-tetralone;
6-hydroxy-4-methylcoumarin;
30 Homogentisic acid gamma lactone;
6-hydroxy-1,2-naphthoquinone;
8-methoxy-2-tetralone;

and physiologically acceptable salts thereof, where appropriate.

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2. The method according to claim 1 wherein administration of the compound takes place on between one and seven occasions, between about 14 days prior to and about 14 days post administration of the nucleotide sequence.

5 3. The method according to claim 1 wherein administration of the compound takes place on between one and seven occasions, between about 7 days prior to and about 7 days post administration of the nucleotide sequence.

10 4. The method according to claim 1 wherein administration of the compound takes place between about 24 hours prior to and about 24 hours post administration of the nucleotide sequence.

15 5. The method according to claim 1 wherein administration of the compound is substantially simultaneous with administration of the nucleotide sequence.

20 6. The method according to ~~any one of claims 1 to 5~~ ^{claim 1} which is repeated between 1 and 4 times, at intervals of between about 1 day and about 18 months.

25 7. The method according to ~~any one of claims 1 to 6~~ ^{claim 1} wherein administration of the nucleotide sequence is via the oral, nasal, pulmonary, intramuscular, subcutaneous or intradermal routes.

30 8. The method according to claim 7 wherein the nucleotide sequence is administered using a gene-gun delivery technique.

9. The method according to ~~any one of claims 1 to 8~~ ^{claim 1} wherein administration of the compound is via the oral, nasal, pulmonary, intramuscular, subcutaneous, intradermal or topical routes.

10. The method according to ~~any one of claims 1 to 8~~ ^{claim 1} wherein the compound is administered using a gene-gun delivery technique.

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11. The method according to ~~either claim 9 or claim 10~~ wherein the compound is administered at a dose of between about 0.1mg and about 100 mg/per kg per administration.

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12. The method according to ~~any one of claims 1 to 11~~ wherein the mammal is a human.

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13. The method according to ~~any one of claims 1 to 12~~ wherein the compound is 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid.

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14. A vaccine composition comprising a nucleotide sequence which encodes for an antigenic peptide associated with a disease state and which is within an appropriate vector, and a compound which will enhance both humoral and cellular immune responses in a mammal which are initiated by the antigenic peptide, the compound being selected from:

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4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;
 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
 N,N-diethyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
 N-isopropyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
 ethyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;
 5-(2-formyl-3-hydroxyphenoxy)pentanonitrile;
 (+)-5-(2-formyl-3-hydroxyphenoxy)-2-methylpentanoic acid;
 5-(2-formyl-3-hydroxyphenoxy)-2,2-dimethylpentanoic acid;
 methyl 3-(2-formyl-3-hydroxyphenoxy)methylbenzoate;
 3-(2-formyl-3-hydroxyphenoxy)methylbenzoic acid;
 benzyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;
 5-[4-(2-formyl-3-hydroxyphenoxy)-N-butyl]tetrazole;
 7-(2-formyl-3-hydroxyphenoxy)heptanoic acid;
 5-(2-formyl-3-hydroxy-4-n-propoxyphenoxy)pentanoic acid;
 5-(4,6-dichloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
 5-(2-formyl-3-hydroxyphenoxy)-N-methylsulphonylpentanamide;
 ethyl 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoate;
 5-(4-chloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
 5-(3-acetylamino-2-formylphenoxy)pentanoic acid;

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Aminoguanidine;
4-(2-formyl-3-hydroxyphenoxy)butanoic acid;
6-(2-formyl-3-hydroxyphenoxy)hexanoic acid;
ethyl 4-(3-acetylamino-2-formylphenoxy)methyl)benzoate;
4-(3-acetylamino-2-formylphenoxy)methyl)benzoic acid;
2-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;
5-[4-(2-formyl-3-hydroxyphenoxy)methyl)phenyl]tetrazole;
5-(2-formyl-3-hydroxy-4-methoxyphenoxy)pentanoic acid;
3-(2-formyl-3-hydroxyphenoxy)propionitrile;
4-Hydroxyphenylacetaldehyde;
Phenylacetaldehyde;
4-Methoxyphenylacetaldehyde;
1-hydroxy-2-phenylpropane;
3-Phenylpropanaldehyde;
15 4-Nitrobenzaldehyde;
Methyl 4-formylbenzoate;
4-Chlorobenzaldehyde;
4-Methoxybenzaldehyde;
4-Methylbenzaldehyde;
20 8,10-Dioxoundecanoic acid;
4,6-Dioxoheptanoic acid;
Pentanedione;
5-methoxy-1-tetralone;
6-methoxy-1-tetralone;
25 7-methoxy-1-tetralone;
2-tetralone;
3-hydroxy-1-(4-methoxyphenyl)-3-methyl-2-butanone;
2',4'-dihydroxy-2-(4-methoxyphenyl)acetophenone;
2-hydroxy-1-(4-methoxyphenyl)-pent-2-ene-4-one;
30 Naringenin 4',5,6-trihydroxyflavonone;
4'-methoxy-2-(4-methoxyphenyl)acetophenone;
6,7-dihydroxycoumarin;
7-methoxy-2-tetralone;
6,7-dimethoxy-2-tetralone;
35 6-hydroxy-4-methylcoumarin;

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Homogentisic acid gamma lactone;
6-hydroxy-1,2-naphthoquinone;
8-methoxy-2-tetralone;

5 namely and physiologically acceptable salts thereof, where appropriate.

15. The vaccine composition according to claim 14 which is in a form suitable for administration via the oral, nasal, pulmonary, intramuscular, subcutaneous or intradermal route.

10 16. The vaccine composition according to claim 14 which is in a form suitable for administration using a gene-gun delivery technique.

15 17. The vaccine composition according to ~~any one of claims 14 to 16~~ ^{claim 14} wherein the compound is 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid.

20 18. Use of a compound in the manufacture of a medicament, wherein administration of the compound to a mammal enhances both humoral and cellular responses initiated by an antigenic peptide associated with a disease state, peptide being expressed as a result of administration to said mammal of a nucleotide sequence encoding for the peptide;

wherein said compound is selected from:

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25 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;
5-(2-formyl-3-hydroxyphenoxy)pentanamide;
N,N-diethyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
N-isopropyl 5-(2-formyl-3-hydroxyphenoxy)pentanamide;
ethyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;
30 5-(2-formyl-3-hydroxyphenoxy)pentanonitrile;
(±)-5-(2-formyl-3-hydroxyphenoxy)-2-methylpentanoic acid;
5-(2-formyl-3-hydroxyphenoxy)-2,2-dimethylpentanoic acid;
methyl 3-(2-formyl-3-hydroxyphenoxy)methylbenzoate;
3-(2-formyl-3-hydroxyphenoxy)methylbenzoic acid;
35 benzyl 5-(2-formyl-3-hydroxyphenoxy)pentanoate;

- 5- [4-(2-formyl-3-hydroxyphenoxy)-N-butyl]tetrazole;
7-(2-formyl-3-hydroxyphenoxy)heptanoic acid;
5-(2-formyl-3-hydroxy-4-n-propoxyphenoxy)pentanoic acid;
5-(4,6-dichloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
5 5-(2-formyl-3-hydroxyphenoxy)-N-methylsulphonylpentanamide;
ethyl 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoate;
5-(4-chloro-2-formyl-3-hydroxyphenoxy)pentanoic acid;
5-(3-acetylamino-2-formylphenoxy)pentanoic acid;
Aminoguanidine;
10 4-(2-formyl-3-hydroxyphenoxy)butanoic acid;
6-(2-formyl-3-hydroxyphenoxy)hexanoic acid;
ethyl 4-(3-acetylamino-2-formylphenoxy)methyl)benzoate;
4-(3-acetylamino-2-formylphenoxy)methyl)benzoic acid;
2-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid;
15 5-[4-(2-formyl-3-hydroxyphenoxy)methyl)phenyl]tetrazole;
5-(2-formyl-3-hydroxy-4-methoxyphenoxy)pentanoic acid;
3-(2-formyl-3-hydroxyphenoxy)propionitrile;
4-Hydroxyphenylacetaldehyde;
Phenylacetaldehyde;
20 4-Methoxyphenylacetaldehyde;
1-hydroxy-2-phenylpropane;
3-Phenylpropanaldehyde;
4-Nitrobenzaldehyde;
Methyl 4-formylbenzoate;
25 4-Chlorobenzaldehyde;
4-Methoxybenzaldehyde;
4-Methylbenzaldehyde;
8,10-Dioxoundecanoic acid;
4,6-Dioxoheptanoic acid;
30 Pentanedione;
5-methoxy-1-tetralone;
6-methoxy-1-tetralone;
7-methoxy-1-tetralone;
2-tetralone;
35 3-hydroxy-1-(4-methoxyphenyl)-3-methyl-2-butanone;

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2',4'-dihydroxy-2-(4-methoxyphenyl)acetophenone;
 2-hydroxy-1-(4-methoxyphenyl)-pent-2-ene-4-one;
 Naringenin 4',5,6-trihydroxyflavonone;
 4'-methoxy-2-(4-methoxyphenyl)acetophenone;
 6,7-dihydroxycoumarin;
 7-methoxy-2-tetralone;
 6,7-dimethoxy-2-tetralone;
 6-hydroxy-4-methylcoumarin;
 Homogentisic acid gamma lactone;
 6-hydroxy-1,2-naphthoquinone;
 8-methoxy-2-tetralone;

and physiologically acceptable salts thereof, where appropriate.

19. The use according to claim 18 wherein the medicament is in a form suitable for administration via the oral, nasal, pulmonary, intramuscular, subcutaneous or intradermal routes.

20. The use according to claim 19 wherein the medicament is in a form suitable for administration using a gene-gun delivery technique.

21. The use according to ^{claim 18} ~~any one of claims 18 to 20~~ wherein the compound is 4-(2-formyl-3-hydroxyphenoxy)methyl)benzoic acid.

22. The use according to ^{claim 18} ~~any one of claims 18 to 21~~ wherein the compound is administered at a dose of between about 0.1 mg/kg and 100 mg/kg per administration.

23. The use according to ^{claim 18} ~~any one of claims 18 to 22~~ wherein the medicament further comprises the nucleotide sequence.

24. A combination of components for separate, sequential or concomitant administration in a method according to claim 1, comprising the nucleotide sequence encoding an antigenic peptide and the compound which enhances both cellular and humoral immune responses initiated by the antigenic peptide.

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